

# Highway Traffic Signal Inventory

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***Draft Proposal***



Chicago Metropolitan  
Agency for Planning

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## Introduction

The purpose of this Proposal is to describe the Chicago Metropolitan Agency for Planning's proposed Highway Traffic Signal Inventory (HTSI) and to explain its expected use. The Proposal will document for CMAP staff, and for its partners, the methods and processes used to create the HTSI. It is anticipated that, if this Proposal is adopted, it will serve as a template for an inventory manual. The HTSI is intended to include geographic-based datasets for highway traffic signals in the Chicago metropolitan area, including Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will Counties in northeastern Illinois, plus Somonauk and Sandwich Townships in DeKalb County and Aux Sable Township in Grundy County.

## Overview of Database Structure

The HTSI will be designed as a file geodatabase using ArcGIS. The geodatabase will contain a master signal inventory with a location based on the inventory number and station from the Illinois Highway Information System. For this database, a "signal" record is associated with an intersection, not an individual signal head. A table, to be related to the master inventory, will have agency inventory attribute information derived from files provided by each participating agency. Agencies expected to participate include the Illinois Department of Transportation and most county highway departments. In addition, some municipalities and townships are expected to participate, including the City of Chicago. Each original input data table or shapefile provided by participating agencies will be maintained in the geodatabase for reference purposes.

## Data Sharing

The HTSI will support not only the work of CMAP, but is also intended to be widely shared on the [CMAP data hub](#) to support the work of our partner agencies and their contractors. Open, unrestricted sharing of transportation system data has many advantages for regional agencies and local communities. The HTSI will be used to influence regional plan development and project implementation through a single, consistent regional geodatabase. But since the inventories may influence plan and project development, we strongly prefer that such data be open so as to maintain accountability and transparency.

Regional planning agencies have been collecting signal inventory data from local communities for many years. The HTSI will address the need for better signal information in an era of increasing interest and capabilities in signal operations and planning.

## Data Accuracy and Completeness

No warranty will be provided with the data. It is intended that the information from agencies be provided on a "snapshot in time" basis, rather than a continuous basis. The information would be suitable for regional planning and the early stages of project development. Information is not expected to be current enough or detailed enough to be used for the preparation of plans and specs.



It is recommended that the inventory be updated on an annual basis for large agencies (IDOT, CDOT, Cook, Lake, Kane, and DuPage Counties) and every two years for other agencies. 0

A number of fields will be included in the dataset. Most of the fields represent current, widespread signal operations practice, information that can be expected to be maintained by the signal's jurisdiction agency. However, some of the fields (e.g., regarding accessible pedestrian signals) represent leading-edge practices that may not be currently maintained in the jurisdiction agency's database system. Thus, it is expected that the initial versions of the geodatabase will contain a large number of null or default values for many fields. Over time, with successive updates, it is expected that the number of null values will decrease.

Importantly, when the data table includes a null value, neither "yes" nor "no" is implied. Null values will indicate that the data is unavailable.

## Purpose of the Highway Traffic Signal Inventory

In 2013, members of the Regional Transportation Operations Coalition (RTOC) suggested that CMAP pursue improvements to the regional traffic signal inventory for the seven-county Chicago region. While agencies throughout the region have long maintained their own inventories, consistent and uniform information about signals across jurisdictions is lacking. Some inventories also lack a GIS component. This complicates data sharing across agencies. The Regional Traffic Signal Inventory (RTSI) seeks to fill this gap and to facilitate inter-jurisdictional communication and more effective transportation studies.

### Inform Policy Decisions

RTSI is not intended to replace current inventories maintained by individual agencies. Rather, it is meant to supplement and build upon data that is already collected. In reviewing the state of current signal inventories throughout the region, it became clear that most data already collected is primarily geared toward facilitating *maintenance* of the system. These inventories will continue to serve this function. RTSI, on the other hand, should consist of data that is primarily geared toward facilitating more informed *policy* decisions.

CMAP staff is considering opportunities to address highway operations needs through increased attention to arterial highway operations, particularly highway traffic signals. RTSI will also support potential CMAP signal policy and funding initiatives by addressing the following questions about regional signal systems:

- What is the age of traffic signal systems? Where are signals deployed? What types of signals are deployed? What basic and advanced signal technologies are deployed?
- Are the current deployments of highway traffic signal technologies appropriate for modern traffic control needs?
- Do deployments of highway traffic signal technologies support community livability and multimodal travel, where appropriate, and accessibility for people with disabilities?



## Address Policy Issues

With answers to these questions, CMAP may be able to address the following policy issues:

- Is maintenance of existing traffic signals sufficient, or should resources for this maintenance be increased?
- Should local and regional signal technology initiatives be included in an updated regional plan to reduce motorist delay and improve safety?
- Should local and regional initiatives to address multimodal and accessibility needs be included in an updated regional plan?

## Highway Traffic Signal Inventory Datasets

The HTSI is intended to include available information about existing highway traffic signals. Planned and programmed signals will not be included in the dataset. The HTSI will consist of a master feature class, a table with related attribute data processed from the data provided by participating agencies, and a feature recordset consisting of original source data provided by participating agencies.

### Master Feature Class

The HTSI will replace an existing shapefile reflecting the regional signal inventory, posted at <https://datahub.cmap.illinois.gov/dataset/signalized-intersections-2012>. The attribute fields for this existing inventory are limited to information regarding signal interconnects, emergency vehicle preemption, red-light running, and centralized control. However, the shapefile is expected to serve as a starting point for the development of a new master feature class.

The information included in the new master feature class will be limited. Limited attribute information will be maintained in this feature class; rather, attribute information will be maintained in the related table of agency data.

Location information will be maintained in the master feature class, including coordinates (in decimal degrees), and major- and minor-streets. This feature class will be tied directly to the IDOT's Illinois Highway Information System (IHIS) by the IHIS inventory number and station fields. The feature class will be tied to the CMAP master highway network by the CMAP node number (if applicable).

CMAP signal interconnect numbers, if applicable, will also be maintained by CMAP staff as a field in this feature class, since that information is not necessarily maintained by participating agencies.

### Attribute Table

The attribute table will consist of information provided by participating agencies, related to the master feature class by the IHIS inventory number and station. Zero, one, or many agency records may be present in this table for each master feature class record.



Attribute table records will be the result of processing files provided by participating agencies. Over time, it is hoped that more and more files provided by participating agencies will reflect the desired attribute table structure, though this is not expected at the outset. Attribute table records are expected to be updated annually by major participating agencies. All attribute table records will be purged and repopulated when a participating agency provides a new file; partial updates are not anticipated or desired.

Ideally, input records provided by the agency will have the IDOT inventory and station number. Alternatively, the latitude and longitude, or intersection location, will be used to conflate the agency data to IRIS to find the inventory and station, so as to facilitate the relationship to the master feature class. If this is the case, a record of the conflation will be saved to simplify future processing.

The proposed field list for the attribute table is included in the appendix.

## **Agency Features**

Data provided by participating agencies will be maintained in the geodatabase to supplement the attribute table. This data will be included in the database “as-is” for reference purposes, should questions come up about the processed attribute table data.

## **HTSI Fields**

Also included is a single, empty feature class HTSIfields. This is a template feature class with which users can create new signal feature classes, either by digitizing features directly into a copy of it, or by importing an existing shapefile to match the HTSI data schema. As noted above, this process may simply be completed by CMAP staff if participating agencies provide a file that doesn't follow this template.



## Appendix: Attribute Table Structure

Field Name	Data Type	Alias	Description (if necessary)	NULL values	Domain	Length
INVENTORYSTATION	Text	Inventory Number and Station	IHIS Inventory and station number of the highway traffic signal on the major street. This field will be the primary key and will relate this table to the master feature class.	No		
XCOORD	Double	X-Coordinate	Longitude of the signal in decimal degrees (4 decimals)	No		nn.nnnn
YCOORD	Double	Y-Coordinate	Latitude of the signal in decimal degrees (4 decimals)	No		nn.nnnn
COUNTY	Text	County		Yes		24
MUNICIPALITY	Text	Municipality		Yes		50
MAJORST	Text	Major Street		Yes		80
MAJOR_RTE	Text	Major Route Type		Yes	ROUTE	24
MAJOR_RTE_NUM	Text	Major Route Number		Yes		3
MINORST	Text	Minor Street		Yes		80
MINOR_RTE	Text	Minor Route Type		Yes	ROUTE	24
MINOR_RTE_NUM	Text	Minor Route Number		Yes		3
MINORST2	Text	Third Intersecting Street		Yes		80



Field Name	Data Type	Alias	Description (if necessary)	NULL values	Domain	Length
MINOR_RTE2	Text	Third Intersecting Route Type		Yes	ROUTE	24
MINOR_RTE2_NUM	Text	Third Intersecting Route Number		Yes		3
MAJORST_JURIS	Text	Major Street Highway Jurisdiction		Yes	JURIS	24
MINORST_JURIS	Text	Minor Street Jurisdiction		Yes	JURIS	24
MINORST2_JURIS	Text	Third Intersecting Street Jurisdiction		Yes	JURIS	24
SIGMAINT_JURIS	Text	Signal Maintenance Jurisdiction		Yes	JURIS	24
RRCOORD	Text	Railroad Coordination	Railroad signal preemption	Yes	YESNO	3
MASTER	Text	Master Controller		Yes	YESNO	3
COMTYPE	Text	Coordination Communication Type		Yes	COMTYPE	24
CONTMANUF	Text	Controller Manufacturer		Yes		50
CONTMODEL	Text	Controller Model		Yes		50
CONTYPE	Text	Controller Type		Yes	CONTYPE	24
VEHDET	Text	Vehicle Detection Type		Yes	VEHDET	24



Field Name	Data Type	Alias	Description (if necessary)	NULL values	Domain	Length
LED_SIGNALS	Text	LED Signals		Yes	YESNO	3
SIGIC	Text	Signal Interconnect		Yes	YESNO	3
SIGICID	Text	Signal Interconnect ID	Participating agency signal interconnect ID (may not be the same as the CMAP interconnect ID)	Yes		24
ADAPTSIG	Text	Adaptive Signal Control		Yes	YESNO	3
TSP	Text	Transit Signal Priority		Yes	YESNO	3
REDENF	Text	Red-Light Camera Enforcement		Yes	YESNO	3
PEDSIG	Text	Pedestrian Signal		Yes	YESNO	3
PEDCD	Text	Pedestrian Countdown Signal		Yes	YESNO	3
ACCPEDSIG	Text	Accessible Pedestrian Signal		Yes	YESNO	3
EMERGPEMP	Text	Emergency Vehicle Preemption		Yes	YESNO	3
EVP_MAKE	Text	Emergency Vehicle Preemption Make		Yes		



Field Name	Data Type	Alias	Description (if necessary)	NULL values	Domain	Length
EVP_MODEL	Text	Emergency Vehicle Preemption Model		Yes		
ADVFLASHACTIVE	Text	Advance Active Warning Flashers		Yes	YESNO	3
ADVFLASHPASSIVE	Text	Advance Passive Warning Flashers		Yes	YESNO	3
ADVDETECTION	Text	Advance Vehicle Detection		Yes	YESNO	3
PHASEEXTENSION	Text	Signal Phase Extension	Signal Phase Extension to accommodate vehicles in dilemma zone	Yes	YESNO	3
CMU_MAKE	Text	Conflict Monitor Make		Yes		50
CMU_MODEL	Text	Conflict Monitor Model		Yes		50
UPS_MAKE	Text	Uninterruptible Power Supply Make		Yes		50
UPS_MODEL	Text	Uninterruptible Power Supply Model		Yes		50
PTZ_CAM_MAKE	Text	Pan-Tilt-Zoom Camera Make		Yes		50
PTZ_CAM_MODEL	Text	Pan-Tilt-Zoom Camera Model		Yes		50
FLASHYELLOW	Text	Flashing Yellow Arrow	Flashing Yellow Arrow Left Turn Signal	Yes	YESNO	3



Field Name	Data Type	Alias	Description (if necessary)	NULL values	Domain	Length
BLANKOUT	Text	Blankout Sign	Blankout Variable Message Sign (Typically Turn Restriction)	Yes	YESNO	3
POLICE	Text	Police Department Nearest		Yes		
SL_QTY	Integer	Street Light Quantity		Yes		
LASTMODDATE	Date	Most Recent Signal Modification Date		Yes		4

Domains:

CNTY: Cook, DeKalb, DuPage, Grundy, Kane, Kendall, Lake, McHenry, Will

COMTYPE: Closed Loop, Central Control

CONTYPE: Pre-timed, Semi-actuated, Fully Actuated, Volume-density Control

JURIS: CDOT, Cook County, DuPage County, IDOT, Kane County, Lake County, McHenry County, Will County, Other

PEDSIG: None, Partial, Full

ROUTE: US, I-, IL, CTH

VEHICDET: Loops, Infrared, Magnetometer, Microwave, Video

YESNO: Yes, No

